

ATGAGAACATTAAAAAACCTCATAACTGTTGTGGCCTTTAGTATTTTTTTGGGTACTGTTGATTTACGTCAAT	72
GTTTATCTCTTTGGTGCTAAAGGAAGCTTGTCATTTATGGCTTTTGGCTGATAGCTTACCTATTAGTCAAA	144
ATGTCCTTATCCTTTTTTTTACAAGCCATTTAAGGGAAGGGCTGGGCAATATAAGGTTGCAGCCATTATTCCC	216
TCTTATAACGAAGATGCTGAGTCATTGCTAGAGACCTTAAAAAGTGTTTACGAGCAAACCTATCCCCTAGCA	288
GAAATTTATGTTGTTGACGATGGAAGTGCTGATGAGACAGGTATTAAGCGCATTGAAGACTATGTGCGTGAC	360
ACTGGTGACCTATCAAGCAATGTCATTGTTTATCGGTCAGAGAAAAATCAAGGAAAGCGTCATGCACAGGCC	432
TGGGCCTTTGAAAGATCAGACGCTGATGTCTTTTTGACCGTTGACTCAGATACTTATATCTACCCTGATGCT	504
TTAGAGGAGTTGTTAAAAACCTTTAATGACCCAACTGTTTTTGGCTGCGACGGGTCACCTTAATGTCAGAAAT	576
AGACAAACCAATCTCTTAACACGCTTGACAGATATTCGCTATGATAATGCTTTTGGCGTTGAACGAGCTGCC	648
CAATCCGTTACAGGTAATATCCTTGTTTGCTCAGGTCCGCTTAGCGTTTACAGACGCGAGGTGGTTGTTCCCT	720
AACATAGATAGATACATCAACCAGACCTTCCTGGGTATTCCTGTAAGTATTGGTGATGACAGGTGCTTGACC	792
AACTATGCAACTGATTTAGGAAAGACTGTTTATCAATCCACTGCTAAATGTATTACAGATGTTTCTGACAAG	864
ATGTCTACTTACTTGAAGCAGCAAAACCGCTGGAACAAGTCCTTCTTTAGAGAGTCCATTATTTCTGTTAAG	936
AAAATCATGAACAATCCTTTTGTAGCCCTATGGACCATACTTGAGGTGTCTATGTTTATGATGCTTGTTTAT	1008
TCTGTGGTGGATTTCTTTGTAGGCAATGTGAGAGAAATTTGATTGGCTCAGGGTTTTAGCCTTTCTGGTGATT	1080
ATCTTCATTGTTGCCCTGTGTCGGAACATTCATTACATGCTTAAGCACCCGCTGTCCTTCTTGTTATCTCCG	1152
TTTTATGGGGTGCTGCATTTGTTTGTCTACAGCCCTTGAAATTATATTCTCTTTTTACTATTAGAAATGCT	1224
GACTGGGGAACACGTAAAAAATTATTATAA	1254

SEQUENCE ID NO. 1

037999-06304

M R T L K N <u>L I T V V A F S I F W V L L I Y V N</u>	24
V Y L F G A K G S L S <u>I Y G F L L I A Y L L V K</u>	48
<u>M S L S F F Y K</u> P F K G R A G Q Y K V A A I I P	72
S Y N E D A E S L L E T L K S V Q Q Q T Y P L A	96
E I Y V V D D G S A D E T G I K R I E D Y V R D	120
T G D L S S N V I V H R S E K N Q G K R H A Q A	144
W A F E R S D A D V F L T V D S D T Y I Y P D A	168
L E E L L K T F N D P T V F A A T G H L N V R N	192
R Q T N L L T R L T D I R Y D N A F G V E R A A	216
Q S V T G N I L V C S G P L S V Y R R E V V V P	240
N I D R Y I N Q T F L G I P V S I G D D R C L T	264
N Y A T D L G <u>K T V Y O S T A K</u> C I T D V P D K	288
M S T Y L K Q Q N R W N K S F F R E S I I S V K	312
K I M N N P F <u>V A L W T I L E V S M F M M L V Y</u>	336
<u>S V V D F F V G N V R E F D</u> <u>W L R V L A F L V I</u>	360
<u>I F I V A L C</u> R N I H Y M L K H P L S <u>F L L S P</u>	384
<u>F Y G V L H L F V L Q P L</u> <u>K L Y S L F T I R</u> N A	408
D W G T R K K L L *	417

SEQUENCE ID NO. 2

[illegible]

primer: sel (sense, nucleotides G³¹⁶ - C³³⁷)

primer: se2 (antisense, for sense nucleotides G¹⁰³¹ - T¹⁰⁵⁰)

primer: sesp1 (sense, for nucleotides G⁴⁷⁵ - A⁴⁹⁴)

primer: sesp2 (antisense, for sense nucleotides T¹²²⁸ – A¹²⁴⁴)

Protein sequence of A98R, the PBCV-1 HA synthase

1 MGKNIIIMVS WYTIITSNLI AVGGASLILA PAITGYVLHW NIALSTIWGV SAYGIFVFGF
61 FLAQVLFSEL NRKRLRKWIS LRPKGWNDVR LAVIIAGYRE DPYMFQKCLE SVRDSYGNV
121 ARLICVIDGD EDDDMRMAAV YKAIYNDNIK KPEFVLCESD DKEGERIDSD FSRDICVLQP
181 HRGKRECLYT GFQLAKMDPS VNAVVLIDSD TVLEKDAILE VVYPLACDPE IQAVAGECKI
241 WNTDTLLSLL VAWRYYSAFC VERSAQSFRR TVQCVGGPLG AYKDIIKEIK DPWISQRFLG
301 QKCTYGDDRR LTNEILMRGK KVVFTPFVAVG WSDSPTNVFR YIVQQTRWSK SWCREIWTLL
361 FAAWKHGLSG IWLAFECLYQ ITYFFLVIYL FSRLAVEADP RAQTATVIVS TTVALIKCGY
421 FSFRAKDIRA FYFVLYTFVY FFCMIPARIT AMMTLWDIGW DTRGGNEKPS VGTRVALWAK
481 QYLIAYMWWA AVVGAGVYSI VHNWMFDWNS LSYRFALVGI CSYIVFIVIV LVVYFTGKIT
541 TWNFTKLQKE LIEDRVLYDA TTNAQSV

567

Nucleotide Sequence of A98R gene in the PBCV-1 Virus Genome

Start: ATG 50901 Stop: TGA 52607

50881 aagacttctt gaaagttaca ATGggtaaaa atataatcat aatggtttcg tggtagacca
50941 tcataacttc aaatctaata gcggttgag gagcctctct aatcttggct ccggcaatta
51001 ctgggtatgt tctacattgg aatattgctc tctcgacaat ctggggagta tcagcttatg
51061 gtattttcgt ttttgagttt ttccttgac aagttttatt ttcagaactg aacaggaaac
51121 gtcttcgcaa gtggatttct ctcagaccta agggttggaa tgatgttcgt ttggctgtga
51181 tcattgctgg atatcgcgag gatccttata tgttccagaa gtgcctcgag tctgtacgtg
51241 actctgatta tggcaacggt gcccgctctga tttgtgtgat tgacggtgat gaggacgatg
51301 atatgaggat ggctgccgtt tacaaggcga tctacaatga taatatcaag aagcccaggt
51361 ttgttctgtg tgagtcagac gacaaggaag gtgaacgcat cgactctgat ttctctcgcg
51421 acatttctgt cctccagcct catcgtggaa aacgggagtg tctttatact gggtttcaac
51481 ttgcaaagat ggacccaggt gtcaatgctg tctgtctgat tgacagcgat accgttctcg
51541 agaaggatgc tattctggaa gttgtatacc cacttgcag cgatcccgag atccaagcgc
51601 ttgcaggtga gtgtaagatt tggaacacag acactctttt gagtcttctc gtgcgttggc
51661 ggtactattc tgcgttttgt gtggagagga gtgccagtc ttttttcagg actgttcagt
51721 gcgttggggg gccactgggt gcctacaaga ttgatatacat taaggagatt aaggaccctt
51781 ggatttccca gcgctttctt ggtcagaagt gtacttacgg tgacgaccgc cggctaacca
51841 acgagatctt gatgcgtggt aaaaagggtg tgttcactcc atttgctggt ggttggctcg
51901 acagtccgac caatgtgttt cggtagatcg ttcagcagac ccgctggagt aagtcgtggt
51961 gccgcgaaat ttggtacacc ctcttcgccg cgtggaagca cggtttgtct ggaatttggc
52021 tggcctttga atgtttgtat caaattacat acttcttctt cgtgatttac ctcttttctc
52081 gcctagccgt tgaggccgac cctcgcgccc agacagccac ggtgattgtg agcaccacgg
52141 ttgcattgat taagtgtggg tatttttcat tccgagccaa ggatattcgg gcgttttact
52201 ttgtgcttta tacatttgtt tactttttct gtatgattcc ggccaggatt actgcaatga
52261 tgacgctttg ggacattggc tgggatactc gcggtggaaa cgagaagcct tccgttggca
52321 cccgggtcgc tctgtgggca aagcaatata tcattgcata tatgtggtgg gccgcggttg
52381 ttggcgctgg agtttacagc atcgtccata actggatggt cgattggaat tctctttctt
52441 atcgttttgc tttggttggg atttgttctt acattgtttt tattgttatt gtgctggtgg
52501 tttattttcac cggcaaaatt acgacttgga atttcacgaa gcttcagaag gagctaactg
52561 aggatcgcgt tctgtacgat gcaactacca atgctcagtc tgtgTGAttt ttctgcaag

Nucleotide and Protein Sequence of *Pasteurella multocida*

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1           M N T L S Q A I K A Y N S N D Y Q
-18  ATTTTTTAAGGACAGAAAATGAATACATTATCACAAGCAATAAAAGCATATAACAGCAATGACTATCAA

18  L A L K L F E K S A E I Y G R K I V E F Q I T
52  TTAGCACTCAAATTATTTGAAAAGTCGGCGGAAATCTATGGACGGAAAATTGTTGAATTTCAAATTACC

41  K C Q E K L S A H P S V N S A H L S V N K E E
121 AAATGCCAAGAAAACTCTCAGCACATCCTTCTGTTAATTCAGCACATCTTTCTGTAAATAAAGAAGAA

64  K V N V C D S P L D I A T Q L L L S N V K K L
190 AAAGTCAATGTTTGCATAGTCCGTTAGATATTGCAACACAACCTGTTACTTTCCAACGTAAAAAATTA

87  V L S D S E K N T L K N K W K L L T E K K S E
259 GTACTTTCTGACTCGGAAAAAACACGTTAAAAATAAATGGAATTTGCTCACTGAGAAGAAATCTGAA

110 N A E V R A V A L V P K D F P K D L V L A P L
328 AATGCGGAGGTAAGAGCGGTCGCCCTTGTACCAAAGATTTTCCCAAAGATCTGGTTTATAGCGCCTTTA

133 P D H V N D F T W Y K K R K K R L G I K P E H
397 CCTGATCATGTTAATGATTTTACATGGTACAAAAAGCGAAAGAAAAGACTTGGCATAAACCTGAACAT

156 Q H V G L S I I V T T F N R P A I L S I T L A
466 CAACATGTTGGTCTTTCTATTATCGTTACAACATTCAATCGACCAGCAATTTTATCGATTACATTAGCC

179 C L V N Q K T H Y P F E V I V T D D G S Q E D
535 TGTTTAGTAAACCAAAAAACACATTACCCGTTTGAAGTTATCGTGACAGATGATGGTAGTCAGGAAGAT

202 L S P I I R Q Y E N K L D I R Y V R Q K D N G
604 CTATCACCGATCATTCCGCAATATGAAAATAAATTGGATATTCGCTACGTCAGACAAAAAGATAACGGT

225 F Q A S A A R N M G L R L A K Y D F I G L L D
673 TTTCAAGCCAGTGCCGCTCGGAATATGGGATTACGCTTAGCAAAATATGACTTTATTGGCTTACTCGAC

248 C D M A P N P L W V H S Y V A E L L E D D D L
742 TGTGATATGGCGCCAAATCCATTATGGGTTTATTCTTATGTTGCAGAGCTATTAGAAGATGATGATTTA

271 T I I G P R K Y I D T Q H I D P K D F L N N A
811 ACAATCATTGGTCCAAGAAAATACATCGATACACAACATATTGACCCAAAAGACTTCTTAAATAACGCG

294 S L L E S L P E V K T N N S V A A K G E G T V
880 AGTTTGCTTGAATCATTACCAGAAGTGAAAACCAATAATAGTGTGCGCGAAAAGGGGAAGGAACAGTT

317 S L D W R L E Q F E K T E N L R L S D S P F R
949 TCTCTGGATTGGCGCTTAGAACAATTCGAAAAACAGAAAATCTCCGCTTATCCGATTGCGCTTTCCGT

340 F F A A G N V A F A K K W L N K S G F F D E E
1018 TTTTTTGCGGCGGTAATGTTGCTTTTCGCTAAAAATGGCTAAATAAATCCGGTTTCTTTGATGAGGAA

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363 F N H W G E D V E F G Y R L F R Y G S F F K
1087 TTTAATCACTGGGGTGGAGAAGATGTGGAATTTGGATATCGCTTATTCCGTTACGGTAGTTTCTTTAAA

386 T I D G I M A Y H Q E P P G K E N E T D R E A
1156 ACTATTGATGGCATTATGGCCTACCATCAAGAGCCACCAGGTAAAGAAAATGAAACCGATCGTGAAGCG

409 G K N I T L D I M R E K V P Y I Y R K L L P I
1225 GGAAAAAATATTACGCTCGATATTATGAGAGAAAAGGTCCCTTATATCTATAGAAAACCTTTACCAATA

432 E D S H I N R V P L V S I Y I P A Y N C A N Y
1294 GAAGATTGCGATATCAATAGAGTACCTTTAGTTTCAATTTATATCCCAGCTTATAACTGTGCAAACCTAT

455 I Q R C V D S A L N Q T V V D L E V C I C N D
1363 ATTCAACGTTGCGTAGATAGTGCCTGAATCAGACTGTTGTTGATCTCGAGGTTTGTATTTGTAACGAT

478 G S T D N T L E V I N K L Y G N N P R V R I M
1432 GGTTCACAGATAATACCTTAGAAGTGATCAATAAGCTTTATGGTAATAATCCTAGGGTACGCATCATG

501 S K P N G G I A S A S N A A V S F A K G Y Y I
1501 TCTAAACCAAATGGCGGAATAGCCTCAGCATCAAATGCAGCCGTTTCTTTTGCTAAAGGTTATTACATT

524 G Q L D S D D Y L E P D A V E L C L K E F L K
1570 GGGCAGTTAGATTCAGATGATTATCTTGAGCCTGATGCAGTTGAACTGTGTTTAAAGAATTTTAAAA

547 D K T L A C V Y T T N R N V N P D G S L I A N
1639 GATAAAACGCTAGCTTGTGTTTATACCACTAATAGAAACGTCAATCCGGATGGTAGCTTAATCGCTAAT

570 G Y N W P E F S R E K L T T A M I A H H F R M
1708 GGTTCACAAATGGCCAGAATTTTCACGAGAAAAACTCACACGGCTATGATTGCTCACCACCTTTAGAATG

593 F T I R A W H L T D G F N E K I E N A V D Y D
1777 TTCACGATTAGAGCTTGGCATTTAAGTATGATGATTCAATGAAAAAATTGAAAATGCCGTAGACTATGAC

616 M F L K L S E V G K F K H L N K I C Y N R V L
1846 ATGTTCCCTCAAACCTAGTGAAGTTGGAAAATTTAAACATCTTAATAAAATCTGCTATAACCGTGTATTA

639 H G D N T S I K K L G I Q K K N H F V V V N Q
1915 CATGGTGATAACACATCAATTAAGAACTTGGCATTCAAAGAAAAACCATTTTGTGTAGTCAATCAG

662 S L N R Q G I T Y Y N Y D E F D D L D E S R K
1984 TCATTAAATAGACAAGGCATAACTTATTATAATTATGACGAATTTGATGATTTAGATGAAAGTAGAAAG

685 Y I F N K T A E Y Q E E I D I L K D I K I I Q
2053 TATATTTTCAATAAAACCGCTGAATATCAAGAAGAGATTGATATCTTAAAGATATTAAATCATCCAG

708 N K D A K I A V S I F Y P N T L N G L V K K L
2122 AATAAAGATGCCAAATCGCAGTCAGTATTTTTTATCCCAATACATTAAACGGCTTAGTGAAAAACTA

731 N N I I E Y N K N I F V I V L H V D K N H L T
2191 AACAATATTATTGAATATAATAAAAAATATATTCGTTATTGTTCTACATGTTGATAAGAATCATCTTACA

754 P D I K K E I L A F Y H K H Q V N I L L N N D
2260 CCAGATATCAAAAAAGAAATACTAGCCTTCTATCATAAACATCAAGTGAATATTTTACTAAATAATGAT

777 I S Y Y T S N R L I K T E A H L S N I N K L S
2329 ATCTCATATTACACGAGTAATAGATTAATAAAACTGAGGCGCATTTAAGTAATATTAATAAATTAAGT

800 Q L N L N C E Y I I F D N H D S L F V K N D S
2398 CAGTTAAATCTAAATTGTGAATACATCATTTTTGATAATCATGACAGCCTATTTCGTTAAAAATGACAGC

823 Y A Y M K K Y D V G M N F S A L T H D W I E K
2467 TATGCTTATATGAAAAATATGATGTCGGCATGAATTTCTCAGCATTAAACACATGATTGGATCGAGAAA

846 I N A H P P F K K L I K T Y F N D N D L K S M
2536 ATCAATGCGCATCCACCATTTAAAAAGCTCATTAAACTTATTTTAATGACAATGACTTAAAAAGTATG

869 N V K G A S Q G M F M T Y A L A H E L L T I I
2605 AATGTGAAAGGGGCATCACAAGGTATGTTTATGACGTATGCGCTAGCGCATGAGCTTCTGACGATTATT

892 K E V I T S C Q S I D S V P E Y N T E D I W F
2674 AAAGAAGTCATCACATCTTGCCAGTCAATTGATAGTGTGCCAGAATATAACACTGAGGATATTTGGTTC

915 Q F A L L I L E K K T G H V F N K T S T L T Y
2743 CAATTTGCACTTTTAATCTTAGAAAAGAAAACCGGCCATGTATTTAATAAAACATCGACCCTGACTTAT

938 M P W E R K L Q W T N E Q I E S A K R G E N I
2812 ATGCCTTGGAACGAAAATTACAATGGACAAATGAACAAATTGAAAGTGCAAAAAGAGGAGAAAATATA

961 P V N K F I I N S I T L *
2881 CCTGTTAACAAGTTCATTATTAATAGTATAACTCTATAA